

Effectiveness of Periarticular Cocktail Injection in Pain Management of Patients Undergoing Total Knee Arthroplasty

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Abstract

Introduction: Total knee arthroplasty is a procedure that can improve quality of life, and it is performed in increasing numbers every year because of the increase in the elderly population due to improved medical technology. However, the problem is that patients avoid this operation because of postoperative pain, which affects patient satisfaction and delays recovery and rehabilitation.

There are many modalities to improve operative pain control, such as femoral nerve blocks, epidural anaesthesia, and periarticular injections. These modalities have been shown to reduce post-operative pain and increase patient satisfaction. Periarticular injection was reported to have good efficacy in controlling pain, cost effectiveness, a few side effects, and ease of use. This method can be used by every surgeon without further training, unlike techniques like epidural anaesthesia or femoral nerve blocks, which require experience and further training.

Material and Methods: The study was conducted in the Department of Orthopaedics at SCB Medical College & Hospital, Cuttack, Odisha. All the IPD patients who got admitted to the Department of Orthopaedics were taken as the study subjects. Total of 30 cases were selected during study period out of which 15 were cases and 15 controls

Observation and Discussion: In Group A, R/L TKA was done in 3/12 patients and in Group B, R/L TKA was done in 8/7. All the Group A patients experienced less pain than the baseline parameters ($p < 0.05$) following TKA. Post-operative evaluation of Range of motion in between 2 Groups there was significant difference in between the two Groups A and B as it was comparatively more in POD1, POD2, POD3, POD7, DOD AND 3 months after follow up in Cocktail Group A. Knee Society Score in POD3 was found to be 100 and 90 in Group A and Group B respectively.

Conclusion: This study has several strengths. First, it is a well powered, randomized study. Second, we included follow-up beyond the initial hospitalization. Third, the injection medications we used are available through any hospital pharmacy and are easily administered during the surgical procedure, so our findings could be generalized for any joint reconstruction surgeon.

Keywords: Total knee replacement, Periarticular injection, Pain management

Introduction

Total knee arthroplasty (TKA) in patients with advanced knee arthritis is an undisputed option for relieving pain and improving joint function. The most important issue concerning patients is "immediate post-surgical pain" which often results after surgery. Although there are a number of treatment options for postoperative pain, a gold standard has not been established. However, there appears to be a shift towards multimodal approaches using regional anaesthesia to minimize narcotic consumption and to avoid narcotic-related side effects [1].

Adequate postoperative pain control is one of the most important concerns for patients considering a total knee arthroplasty. Severe

pain may lead to restricted postoperative knee range of motion (ROM), arthrofibrosis, and an overall poor patient satisfaction [3].

Ineffective or inadequate management of postoperative pain may lead to higher degree of patients' dissatisfaction thus reducing patient's willingness to undergo further treatment if required in future [3,4]. Kehlet and Dahl introduced the concept of multimodal analgesia. Multimodal analgesia will minimize the postsurgical pain and improve the postoperative outcome [4].

The use of periarticular injection to control pain after TKR has gained wide acceptance as it provides analgesia locally in the surgical site with minimal systemic side effects. Along with pain control, it also maximizes muscle control, promotes rehabilitation, and decreases venous stasis. This technique is cost effective, and is easy to administer which does not require any special technical skill for administration [5].

Objective

To assess the post-operative improvement in patients after cocktail intraoperative periarticular injection



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Place of the study:

The study was conducted in the Department of Orthopaedics at SCB Medical College & Hospital, Cuttack, Odisha.

Materials & Methods

Study design: Longitudinal interventional study.

Study period: October 2018 to September 2020

Study population: The osteoarthritic patients admitted to IPD for TKR meeting the admission criteria and admitted to the Department of Orthopaedics, SCB MCH, Cuttack during October 2018 to September 2020 were the study population.

Study Subjects: All the IPD patients who got admitted to the Department of Orthopaedics were taken as the study subjects.

Sample size estimation: Total of 30 cases selected during study period out of which 15 were randomly allocated into study and 15 into control group by block randomization. The informed written consent of each osteoarthritis patient proposed for TKR as case and control was taken.

- Cases-patients in whom intraoperative periarticular cocktail injection was given.

- Controls-patients in whom no intraoperative periarticular cocktail injection was given.

Ethical clearance for the study from the Institutional Ethical Committee of S.C.B Medical College was obtained.

The data obtained as per the assessment tool and questionnaire was coded with the help of guide to ensure quality of the scientific research. The coded data were entered in the statistical software SPSS (version 21).

Observation

Table-I depicts clinical and socio-demographic characteristics of study subjects. Among the study participants 15 were randomly allocated into study and 15 into control Group by block randomization. From amongst the 15 study participants in experimental Group A, 8 (53.3%) were males and 7 (46.7%) were females. Similarly, in the control Group B out of 15 study participants 9 (60%) were males and 6 (40%) were females. The mean age ± SD of Group A patients was 65 ± 2 years and mean age ± SD of Group B patients was 64 ± 4 years. The mean weight ± SD of Group A patients was 75.4 ± 1.45 kg and the mean weight ± SD of Group B patients was 74.3 ± 2.10 kg. In Group A, R/L TKA was done in 3/12 patients and in Group B, R/L TKA was done in 8/7.

Table-II revealed visual analogue pain score (VAS Score). All the Group A patients experienced less pain than the baseline parameters (p<0.05) following TKA. Patients in the Cocktail Group A have significantly less VAS Score than the control B Group during the post operative days POD 1, POD 2, POD3, POD7, DOD and 3 months following discharge. VAS Score was less from POD 1 to DOD and follow up after 3 months in Group A

Table-III depicts the post-operative evaluation of Range of Motion in between 2 Groups. In our study on post-operative evaluation of Range of motion in between 2 Groups there was significant difference in between the two Groups A and B as it was comparatively more in POD1, POD2, POD3, POD7, DOD AND 3 months after follow up in Cocktail Group A. The mean range of motion in Group A and Group B on POD1 was 112.2 ± 1.20 and

Table I : Clinical and socio demographic characteristics of study subjects (experimental cocktail Group A = 15, Control group = 15)

PARAMETERS		EXP GROUP A (N=15) (100%)	CONTROL GROUP B (N=15) (100%)
GENDER	MALE	8 (53.3%)	9 (60%)
	FEMALE	7 (46.7%)	6 (40%)
RESIDENCE	RURAL	2 (13.3%)	1 (6.7%)
	URBAN	13 (86.7%)	14 (93.3%)
SES TYPE(MODIFIED B.G. PRASAD 2020)			
UPPER(I)		0	0
UPPER MIDDLE(II)		0	0
MIDDLE (III)		5 (33.3%)	4 (26.7%)
LOWER MIDDLE(IV)		10 (66.7%)	11 (73.3%)
LOWER (V)		0	0
MEAN AGE±SD IN YRS		65 ± 2	64 ± 4
MEAN HT±SD IN M		1.67 ± 0.43	1.65 ± 0.56
MEAN WT±SD IN KG		75.4 ± 1.45	74.3 ± 2.10

Table II: Evaluation of pain by VAS score in 2 groups

MEAN BMI±SD (KG/M2)	31.6 ± 1.23	30.9 ± 2.45
TOURNIQUET TIME IN MINS	70	72
TKA(R/L)	(3/12)	(8/7)
COMORBIDITIES		
DIABETES	5 (33.3%)	6 (40%)
HTN	3 (20%)	5 (33.3%)
HYPOTHYROIDISM	1 (6.7%)	0
RA	0	1 (6.7%)
DEFORMITY IN ⁰ (VALGUS/VARUS)	18.7 ± 1.33	19.2 ± 1.22
FLEXION ANGLE IN ⁰	120.2 ± 1.20	109.8 ± 1.31

DOS = (Date of surgery); POD = (Post operative day); DOD = (Date of discharge)

Table III: Post operative evaluation of range of motion in between 2 groups

STUDY GROUP	RANGE OF MOTION(pre-operative)	POD1	POD2	POD3	POD7	DOD	FOLLOW UP AFTER 3 MONTHS
GROUP A	110.2 ± 1.20	112.2 ± 1.20	115.2 ± 1.21	116.5 ± 1.32	118.6 ± 1.12	120.2 ± 1.20	122.8 ± 1.23
GROUP B	110.2 ± 1.20	110.2 ± 1.20	111.2 ± 1.21	113.5 ± 1.32	113.3 ± 1.12	116.2 ± 1.20	120.8 ± 1.32

P value < 0.0001

POD = (Post operative day)

Table IV: Evaluation of pain by knee society score in between 2 groups

STUDY GROUP	PRE OP DAY	POD3	POD7	DOD	FOLLOW UP AFTER 3 MONTHS
GROUP A	55	100	120	130	190
GROUP B	50	90	105	110	180

Pvalue<0.0001

110.2 ± 1.20, on POD2 was 115.2 ± 1.21 and 111.2 ± 1.21, on POD3 was 116.5 ± 1.32 and 113.5 ± 1.32.

Table-IV gives information on the knee society score on evaluation of patients in the 2 groups. Knee Society Score in POD3 was found to be 100 and 90 in Group A and Group B respectively. Similarly in POD 7 it was found to be 120 and 105 respectively in Group A and Group B and on DOD it was found to be 130 and 110 in Group A and Group B respectively. So, the assessment Knee Society Score in Group A was found to be more than Group B and this difference was found to be statistically significant (p<0.0001).

Discussion

Among the study participants 15 were randomly allocated into study and 15 into control Group by block randomization. From amongst the 15 study participants in experimental Group A, 8 (53.3%) were males and 7 (46.7%) were females. The mean BMI ± SD (KG/M2)

was 31.6 ± 1.23 in Group A and was 30.9 ± 2.45 in Group B. The clinical and demographic variables of the two groups in our study did not show any significant difference. This was similar to a study conducted by Shah Vikram et al [4]. Sadigursky David et al [2] in his study concluded that out of a total of 59 patients who were selected, 36 were (61%) females and 23 (39%). Among the study participants 15 were randomly allocated into study and 15 into control group by block randomization.

Regarding visual analogue pain score (VAS Score) the entire Group A patients experienced less pain than the baseline parameters ($p < 0.05$) following TKA. Patients in the cocktail group have significantly less VAS score than the control B Group during the post operative days and 3 months following discharge. However, in a study by Shah Vikram et al [4] it was only in early post operative (1-4) days there was lower VAS score in Group A than in Group B. Furthermore, in their study there was also no significant difference at the end of 3 months i.e. Group A and Group B. In a study conducted by Sadigursky David et al [2] lower scores on the visual analog scale for pain were seen in patients in Group A (3.7–3.9) 24 hours post-procedure as well as 48 hours post-procedure, respectively; Group B presented higher values on the pain scale (5.3 at 24 hours post-procedure and 4.8 at 48 hours post-procedure) [2].

Vendittoli et al [8] demonstrated that the use of periarticular infiltration with multimodal drugs could result in less pain, improved functional recovery, and patient satisfaction. However, Koh et al [9] observed that pain reduction was significant in the immediate postoperative period, with no improvement in functional results or patient satisfaction after 48 hours.

There is significant difference in between the two groups and B when post-operative range of motion is considered. In terms of physical-therapist-assessed ROM, there was no significant differences in active extension, active flexion, passive extension, or passive flexion for Group A, B, or C patients compared with Group D patients in a study conducted by Todd C et al [10].

Knee Society Score in Group A was found to be more than Group B and this difference was found to be statistically significant ($p < 0.0001$). The side effects following NSAIDs in Group B was more in comparison to the Group A. There significant difference in between the two Groups A and B was attributed to more intake of analgesics for relief of pain in Group B. The post-operative range of movement and the distance walked in 6 minutes on the post-operative day 5th, 6th, and 7th was better in the cocktail group and the difference observed was significant.

Conclusion

Ineffective or inadequate management of postoperative pain may lead to higher degree of patients' dissatisfaction thus reducing patient's willingness to undergo further treatment if required in future. In patients with advanced knee arthritis, total knee replacement (TKR) has been found to be the most successful surgical procedure. However, early postoperative pain control is pivotal in reducing the hospital stay, increasing patient satisfaction, and for better rehabilitation. It also reduces the potential for postoperative complications such as pneumonia or deep vein thrombosis. The use of periarticular injection to control pain after TKR has gained wide acceptance as it provides analgesia locally in the surgical site with minimal systemic side effects. Along with pain control, it also maximizes muscle control, promotes rehabilitation, and decreases venous stasis. This technique is cost effective, and is easy to administer which does not require any special technical skill for administration

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his/her consent for his/her images and other clinical information to be reported in the Journal. The patient understands that his/her name and initials will not be published, and due efforts will be made to conceal his/her identity, but anonymity cannot be guaranteed.

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